REMARKS

Claims 1, 20-30 and 32-34 remain in the application. Claims 1, 20-25, and 32 have been amended to recite that the adhesive is a liquid adhesive that can permeate into the winding. In addition, as amended, claims 1 20-30 and 32-34 clarify the heat treating temperature that is required to cure the adhesive, and the thermal processing temperature which modifies the mechanical and magnetic properties of the wound amorphous metal ribbon or strip. Further, the claims have been amended to call for permeation of a liquid adhesive into the three dimensional shape. Support for this amendment is found at page 5, lines 4-9 of the original specification. This permeation is only possible if the adhesive is a liquid. Moreover, it is contemplated that the Scotch Cast adhesive by 3M is diluted by acetone, a liquid at room temperature, to achieve about 20% mixture by volume of the adhesive. Since the volume of the adhesive is indicated, the adhesive is also a liquid, in contrast to a powder adhesive, which is generally measured by weight rather than by volume. The curing of the adhesive requires heating to a heat treating temperature as indicated in original claim 6, which has now been withdrawn, and at page 5, lines 14 through 17 of the original specification, which states "Heat cured epoxies that require various temperatures as well two stage epoxies that cure at room temperature would also be suitable." The thermal processing temperature is present in the original specification at page 8 lines 4 through 10, which states "The thermal processing could also be performed as a magnetic field to produce a favorable nano-crystalline orientation to minimize losses. Some soft magnetic ribbon materials require thermal processing to achieve the desired magnetic properties while others require thermal processing to properly relieve the stresses in the milled electro-mechanical component shape as a result of the milling process." Claim 7 of the original specification requires a heat treating temperature to be a fraction of the thermal processing temperature, the fraction being about ¼ (claim

10), ½ (claim 8) and ¾ (claim 9). It is respectfully submitted that each of the amendments to the claims is clearly supported by the original specification.

Claim Rejections – 35 USC § 102(e)

Claims 1, 20-25 and 32-34 were rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 6,803,694 to DeCristofaro et al.

The Examiner has indicated as follows:

> DeCristofaro discloses a process of making a soft magnetic metal electromechanical component (note steps (i) to (v), col. 12, lines 53 to col. 13, line 10) comprising: winding soft magnetic metal ribbon into a toroid (step i); applying an adhesive to the toroid (step iii); curing the adhesive (col. 13, lines 52-56); applying a magnetic field to the toroid (col. 14, lines 50-52); containing the toroid within a milling assembly (step iv); milling the toroid; and thermally processing the electro-mechanical component shape (step ii).
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> Regarding Claim(s) 22, 23, DeCristofaro further teaches applying the adhesive in an atmospheric soak process (col. 13 lines 48-56) where a vessel is provided and the toroid is immersed in the adhesive and evacuating the vessel (e.g. example at col. 14, lines 9-15).
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> Regarding Claim(s) 25, DeCristofaro further teaches curing the adhesive at a heat treating temperature (e.g. 175 deg C) and thermally processing the component at a thermal processing temperature (e.g. cooling temperature after curing), where the heat treating temperature is a fraction of the heat processing temperature.

The steps (i) to (v), col. 12, lines 53 to col. 13, line 10 of Decristofaro et al. state: "Generally stated, the method comprises the steps of: (i) spirally winding ferromagnetic amorphous metal strip or ribbon material to form a wound cylinder of annular cross-section having cylindrical inner and outer surfaces and two annular faces, the faces being separated by an axial thickness; (ii) heat treating the cylinder; (iii) adhesively bonding each of the layers of the wound cylinder to the layers adjacent thereto with an adhesive; and (iv) forming the component by cutting a plurality of slots in at least one of the

annular faces, the slots extending generally radially between the inner surface and the outer surface and having a depth less than the axial thickness. Preferably the adhesive bonding is carried out by impregnation. Optionally, a finishing step (v) is carried out comprising coating the component with a suitable surface finish. The heat-treating step comprises one or more heat treatments to modify the mechanical or magnetic properties of the amorphous metal feedstock. Such optional heat treatments facilitate machining operations and improve the magnetic properties of the component. Steps (i) to (v) may be carried out in a variety of orders and using a variety of techniques including those set forth hereinbelow." Steps (i) through (v) of DeCristofaro et al., teach adhesive bonds without the need for any heat treatment. By way of contrast, the subject invention uses an adhesive such as Scotch Cast adhesive by 3M (page 5 line 6 of the original specification of subject invention) which requires curing of the adhesive at a heat treating temperature. Scotchcast 265 is a high temperature resin that requires curing at 177°C to 232°C, typically for 20 to 2 minutes. The heat treatment indicated in step (ii) of the DeCristofaro et al. USP 6,803,694 patent is clearly designed to modify the mechanical or magnetic properties of the amorphous metal feedstock. DeCristofaro et al.'s heat treatment is carried out at a temperature of 695°F or 368°C (see page 8 line 3 of original specification of the subject invention and is therefore only equivalent to the thermal processing temperature of the invention defined by claims 1, 20-25 and 32-34, as amended. More specifically, claim 1, as amended, cures the adhesive at a reduced adhesive curing temperature; not at a thermal heating step where the mechanical and magnetic properties of the amorphous wound ribbon stock would be modified. This distinction over the DeCristofaro et al. process is further delineated by the recitation in claim 25, as amended.

Accordingly, reconsideration of the rejection of present claims 1, 20-25 and 32-34 under 35 USC §102 as being anticipated by DeCristofaro et al. is respectfully requested.

Claim Rejections – 35 USC § 102(e)

Claims 1, 20-25 and 32-34 were rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 6,803,694 to DeCristofaro et al.

With respect to this rejection, the Examiner has stated:

> Decristofaro discloses a process of making a soft magnetic metal electromechanical component (note steps (i) to (v), col. 12, lines 53 to col. 13, line 10) comprising: winding soft magnetic metal ribbon into a toroid (step i); applying an adhesive to the toroid (step iii); curing the adhesive (col. 13, lines 52-56); applying a magnetic field to the toroid (col. 14, lines 50-52); containing the toroid within a milling assembly (step iv); milling the toroid; and thermally processing the electro-mechanical component shape (step ii). Regarding Claim(s) 22, 23, Decristofaro further teaches applying the adhesive in an atmospheric soak process (col. 13 lines 48-56) where a vessel is provided and the toroid is immersed in the adhesive and evacuating the vessel (e.g. example at col. 14, lines 9-15). Regarding Claim(s) 25, Decristofaro further teaches curing the adhesive at a heat treating temperature (e.g. 175°C) and thermally processing the component at a thermal processing temperature (e.g. cooling temperature after curing), where the heat treating temperature is a fraction of the heat processing temperature.

As previously noted, claims 1, 20-25 and 32-34, as amended, require an adhesive heat treating temperature that is different from that of the thermal processing temperature. In view of the amendments to claims 1-13 and the remarks set forth above, it is respectfully submitted that each of claims 1, 20-25 and 32-34 patentably defines over the DeCristofaro et al. disclosure.

Accordingly, reconsideration of the rejection of claims 1, 20-25 and 32-34 under 35 USC §102(e) as being anticipated by DeCristofaro et al. is respectfully requested.

Claim Rejections – 35 USC § 103

Claims 26-28 were rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6,803,694 to DeCristofaro et al.

With respect to this rejection, the Examiner has stated:

> It would have been an obvious matter of design choice to choose any desired fraction since Applicant has not disclosed that the claimed fraction between the heat treating temperature and the heat processing temperature solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the fraction taught by Decristofaro.

It is respectfully submitted that the particular ratio extant between the adhesive curing heat treatment temperature and the thermal processing temperature is a necessary prerequisite to the production of high quality magnetic core. The thermal processing temperature is a temperature that is specific to the magnetic alloy ribbon chosen. The amorphous metal ribbon requires a thermal processing temperature of 685°C for about 60 minutes, as stated at page 8 lines 2 -10 of the original specification. The thermal processing step embrittles the ribbons, with the result that the milling of winding slots is carried out after curing of the adhesive but before the thermal processing step. Therefore the ratio between the adhesive curing heat treatment temperature and the thermal processing temperature is a critical factor, which is made more complex by the fact that different adhesives have different cure temperatures and different amorphous metallic ribbons have unique thermal processing temperatures.

Cores of the type called for by applicant's claims are used with high AC frequency electrical circuitry. As such, the cores are subject to mechanical stresses and vibrations. If individually wound coils are not securely attached to the adjacent coil of the wound amorphous ribbon package, excessive vibrations would likely lead to core disintegration. Through proper selection of an adhesive and its

curing process, there is created a bond that produces an integral functional core. Inasmuch as the adhesive does not contribute to the magnetic properties of the core, it constitutes excess material that should be minimized. Considering that the amorphous metal strips are typically 0.001 to less than 0.002 inch in thickness, a mere adhesive thickness of 0.001 inch results in a magnetic core content of only 50% to 75% by volume. The adhesive thickness has to be sufficiently thin (well below 0.0005 inch) to enable the liquid adhesive to permeate between the coils of the winding. Thinning of the adhesive is effected through use of an acetone diluting agent, as detailed at page 5, lines 4 to 9 of the original specification. The ability of the milling cutter to create winding slots requires the individual sheets of the metallic glass strips or ribbons to be bonded to each other. Otherwise the individual ribbons that are unsupported or unbounded flex readily; this flexing action results in a poorly defined milled slot structure. For these reasons, it is respectfully submitted that the wound ribbon package infiltrated with liquid adhesive and cured prior to any milling operation, as required by present claims 26-28, are not disclosed or suggested by DeCristofaro et al.; reconsideration of the rejection of claims 26-28 under 35 USC 103(a) as being unpatentable over DeCristofaro et al. is respectfully requested.

Claims 29-30 were rejected under 35 U.S.C. 103(a) as being unpatentable over Decristofaro et al. in view of US Patent 2,208,811 to Kiehne.

With respect to this rejection, the Examiner has stated:

> Decristofaro discloses the claimed manufacturing method as relied upon above in Claim 20. Decristofaro does not teach a "cutting tool" in the step of milling. Kiehne discloses a process of using a cutting tool (e.g. 19) to mill and shape. It would have obvious to one of ordinary skill in the art at the time the invention was made to have used the cutting tool of Kiehne to shape the slots of Decristofaro, to provide accurate machining and shaping of the toroid.

US Patent 2,208,811 to Kiehne discloses a process for making threading dies. The threading dies do not have slots milled in a wound adhesively bonded amorphous metal core. Decristofaro et al. disclose milling a wound, thermally heat treated amorphous metal core (col. 5, lines 10–20). The DeCristofaro et al. process causes embrittlement of ribbons, which will shatter during the milling operation. This is because the package is thermally processed before being bonded with the adhesive and then milled. The brittle amorphous metal sheets in the wound amorphous metal package DeCristofaro et al. creates are subject to flexure and breakage. On the other hand, the three dimensional, soft magnetic mass called for by applicant's claims is produced by winding the amorphous ribbon package, applying the adhesive by permeation and curing the adhesive to form a fully supported integral structure with or without an outside ring frame. This fully supported solid article is then milled to create slots for the windings. The milled integral core package is then thermally heat treated to enhance the magnetic properties of the amorphous metal ribbons in the core package. The sequence of process steps required by present claims 29-30 is clearly different from that disclosed by the combined teachings of DeCrisofaro et al and Kiehne; it advantageously avoids the embrittlement issues created by the combined teachings of the cited references. When compared to any article produced from the combination of DeCristofaro et al. and Kiehne, the three dimensional, soft magnetic mass called for by claims 29-30 avoids the embrittlement issues previously discussed. It has fewer manufacturing defects and, as a consequence, is less expensive to produce and more reliable in operation.

Accordingly, reconsideration of the rejection of claims 29-30 under 35 USC 103(a) as being obvious over the combination of DeCristofaro et al. and Kiehne is respectfully requested.

CONCLUSION

In view of the amendments to the claims and the remarks set forth above, it is respectfully submitted that the present application is in allowable condition. Accordingly, reconsideration and allowance of present claims 1, 20-30 and 32-34 are earnestly solicited.

Respectfully submitted,
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